

Electronic Notebooks for Practical Laboratory Reports

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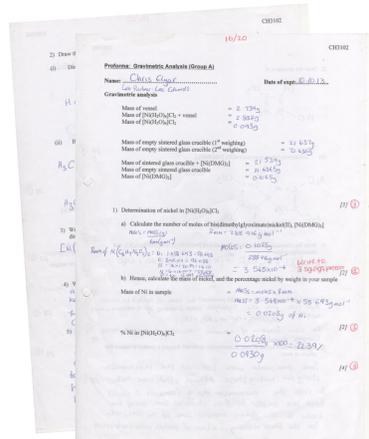
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1. Practical Work in Taught Programmes in Physical & Life Sciences

Laboratory notebooks and reports are an opportunity for formative and summative assessment:

- Traditionally on paper
- Proformas
 - Templates to guide student responses
 - Organise responses for assessment
- Questions and problems
 - Encourage reflection
 - Opportunity for application of theory
- Formal reports
 - Scientific writing to professional standards



2. Electronic Laboratory Notebooks

Now widely used in industry. Typical capabilities:

- Entry and display of text, images and data
- Searching
- Collaborative working
- Security - access rights, revision tracking, timestamping

Are electronic notebooks a suitable replacement for paper notebooks and reports in taught programmes? What is currently available?

Considerations:

- Flexibility - different styles of practical work and reporting
- Pedagogic value - opportunities for feedback and reflection, authenticity
- Ease of use and workload - for students and staff
- Cost - commercial or open source, IT requirements

3. Methods

- Select systems for evaluation
 - Tools pitched at education/academia
- Obtain access to full or trial versions
 - Open source systems installed on a local server
 - Trial subscriptions to hosted services
- Evaluation - by a staff member and a year 3 chemistry undergraduate
 - How well does the system handle common report components?
 - Formatted text, images, equations, numerical data
 - Is there flexibility in structure and layout of reports?
 - Can staff return feedback to students?
 - Can staff create templates for students to populate?

4. IndigoELN (<http://lifescience.opensource.epam.com/indigo/eln/index.html>)

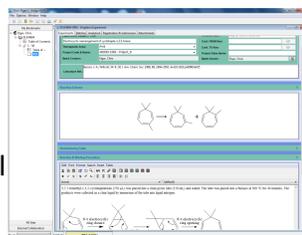
- Notebook system for medicinal chemistry
- Web based, requires Java

Pros

- Freely available open source (optional commercial support)
- Authenticity - used by Pfizer

Cons

- Highly discipline specific (medicinal chemistry)
- Difficult to add feedback



5. MediaWiki (<https://www.mediawiki.org/wiki/MediaWiki>)

- General purpose wiki platform

Pros

- Freely available open source
- Established and well tested

Cons

- Mark-up language required to create and edit documents



6. Perkin Elmer Elements (<https://elements.perkinelmer.com/>)

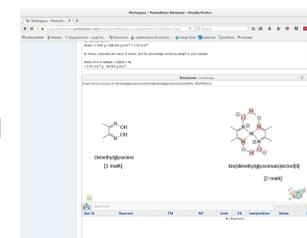
- Commercial, cloud based
- Web browser interface
- Documents composed from "elements"
 - Abstract, protocol, spreadsheet, image, chemical
 - Template creation from empty "elements"
- Collaboration
 - Editing of shared documents, ability to add comments

Pros

- Familiar and straightforward user interface
- Some useful discipline specific (chemistry) features

Cons

- Cost - licensed per user per year, multiuser packages available
- Some lack of flexibility
 - Limits to number of some "element" types in each report
 - Feedback mechanisms somewhat restrictive



7. LabTrove (<http://www.labtrove.org/>)

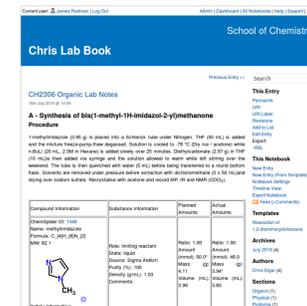
- Web browser interface
- Blog-style reports, with chemistry features

Pros

- Freely available open source
- Simple to use

Cons

- Restrictive - blog format with comments at end
- Provision of continued support and updates



8. Mahara (<https://mahara.org/>)

- Web based electronic portfolio system
- Flexible document construction

Pros

- Freely available open source
- Flexibility and ease of report writing
- Built with education in mind (sharing, feedback, reflection)

Cons

- Not an authentic electronic lab-book



9. eLabFTW (<http://www.elabftw.net/>)

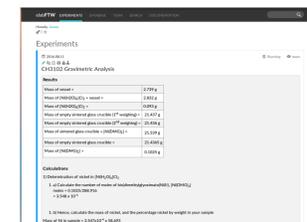
- Web browser interface
- Documents are largely text based

Pros

- Freely available open source
- Editor with good formatting capability

Cons

- Not designed to support classroom use
 - Limited ability to add feedback



10. Lab Archives (<http://www.labarchives.com/>)

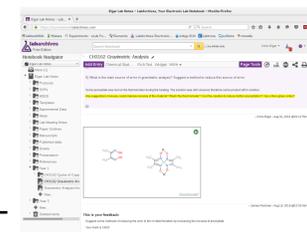
- Commercial, cloud based
- Web browser interface, Android and iOS apps
- Flexible report construction
 - Text, sketches, spreadsheets, pdfs etc.
- Collaboration
 - Ability to edit items and comment in shared documents
 - Template creation and sharing possible
 - Full revision tracking

Pros

- Straightforward user interface
- Good flexibility - applications in both teaching and research
- Classroom package designed for facilitating student-staff interactions

Cons

- Cost



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